1. $\sin\frac{\pi}{4} =$ $\frac{\sqrt{2}}{2}$

2. $\tan\frac{\pi}{3} =$ $\sqrt{3}$

3. $\sec\frac{\pi}{3} =$ 2

4. $\cos\frac{\pi}{2} =$ 0

5. $\cot\frac{\pi}{4} =$ 1

Apr 5-7:32 AM

76. $\int_0^1 f(x)\,dx = 2 \quad \int_0^4 f(x)\,dx = -3$

$$\int_1^4 3f(x)+2\,dx = 3\int_1^4 f(x)\,dx + \int_1^4 2\,dx$$

$$= 3\left[\int_0^4 - \int_0^1\right] + 2x\Big|_1^4$$

$$= 3\left[-3-2\right] + 8-2$$

$$= -9$$

Apr 5-7:51 AM

79. $f(3)=8 \quad f'(3)=5$

$\lim_{x\to c} f(x) = f(c)$

f is differentiable then it is continuous
f' exists

T A) $\lim_{x\to 3} f(x) = 8$

$f'(a) = \lim_{b\to a} \frac{f(b)-f(a)}{b-a}$

T B) $\lim_{x\to 3^+} = \lim_{x\to 3^-}$

T C) $\lim_{x\to 3} \frac{f(x)-8}{x-3} = 5 \quad f'(3)=5$

T D) $\lim_{h\to 0} \frac{f(3+h)-f(3)}{h} = 5 \quad f'(3)=5$

could be False E) $\lim_{x\to 3} f'(x) = 5$

we don't know if f' is continuous

Apr 5-7:54 AM

83. f, f' increasing

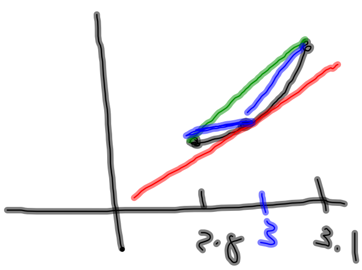
f'' must be pos
f concave up

x	2.5	2.8	3.0	3.1
f	31.25	39.20	45	48.05

$f'(3)$

ave rate: SDQ

$\frac{48.05-39.20}{3.1-2.8} = 29.5$



LDQ $\frac{45-39.2}{3.0-2.8} = 29$

D) 30

RDQ $\frac{48.05-45}{3.1-3.0} = 30.5$

Apr 5-8:03 AM

86. $p(x) = (x-3)^2 - \frac{(x-3)^4}{2!} + \frac{(x-3)^6}{3!} \dots (-1)^{n+1}\frac{(x-3)^{2n}}{n!}$

$f^{30}(3)$

$$\cancel{(-1)^{16}} \frac{\cancel{(x-3)}^{30}}{15!} = \frac{f^{30}(3)}{30!}\cancel{(x-3)}^{30}$$

$$\sum_{n=0}^{\infty} \frac{f^n(a)(x-a)^n}{n!}$$

$$30! \cdot \frac{1}{15!} = \frac{f^{30}(3)}{\cancel{30!}}$$

Apr 5-8:12 AM

87. $f^4(x) = e^{\sin x}$

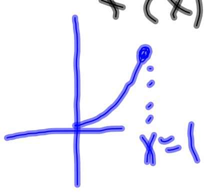
Lagrange error = Taylor Remainder

M = max of $e^{\sin x}$ on $[0,1]$

$$\boxed{\frac{M\,(x-a)^{n+1}}{(n+1)!}}$$

M is an upper bound for $f^{n+1}(x)$

$$e^{\sin(1)}\frac{x^4}{4!}$$



$$e^{\sin(1)}\frac{1}{4!} =$$

Apr 5-8:16 AM

88 $R(t)$

$\uparrow$

is a rate

they want ave value of R

$$\frac{1}{b-a}\int_a^b R\,dt$$

in this case

$$\text{ave rate} \neq \cancel{\frac{f(b)-f(a)}{b-a}}$$

Apr 5-8:54 AM

91 if f & g are inverses

then $\boxed{g'(x) = \frac{1}{f'(g(x))}}$

$$g'(x) = \frac{1}{f'(y)}$$

Apr 5-8:56 AM

Review 22 Differential equations
(initial value problems)

both have derivative, $\frac{dy}{dx} = \_\_\_$

$\boxed{\text{want to work backwards to get } y}$

initial value problem: use initial conditions to find c

Apr 5-8:24 AM

solve:

$$\frac{dy}{dx} = \cos(2x) \qquad y(0) = 1$$

find $y(4)$

$$y = \int \cos(2x)\,dx$$

$$y = \frac{\sin(2x)}{2} + c$$

ic $1 = \frac{\sin 0}{2} + c$

$c = 1$

$y = \frac{1}{2}\sin(2x) + 1$

Apr 5-8:28 AM

acceleration $a = -32 \frac{ft}{s^2}$

2nd order diff. eq. Initial velocity = 155 ft/sec

initial height = 5 ft.

find height as a function of time

$v = -32t + c$

$155 = c$

$h = -16t^2 + 155t + c$

$5 = c$

$h = -16t^2 + 155t + 5$

Apr 5-8:30 AM

Sep. var.

$\frac{dy}{dt} = 5(1-y)$, $y(0) = 2$

$\int \frac{dy}{1-y} = \int 5\,dt$

$-\ln|1-y| = 5t + c$

$\ln|1-y| = -5t + c$

$1-y = e^{-5t+c} = e^{-5t} \cdot e^{c}$

IC $y(0) = 2$

$1-y = Ae^{-5t}$

$1-2 = Ae^{0} = A$

$A = -1$

$1-y = -1e^{-5t}$

$y = 1 + e^{-5t}$

Apr 5-8:35 AM

(indefinite)
what if you can't integrate to solve d.e.?

approximation methods:

ftc final = initial + disp.

$y(4) = y(0) + \int_0^4 f' \, dx$

or

Euler's method

x	y	y'
0	2	
	⋮	
	—	

initial

final

or slopefield shows the graph of y

Apr 5-8:41 AM